Ordering number: EN 4187

Monolithic linear integrated circuit

No. 4187

SANYO

LA9215

CD player output amplifier

Overview

The LA9215 is an analog output amplifier designed for use in CD players, DAT and other digital audio equipment in combination with a 1-bit D/A converter. It can be used directly with non-stabilized power supplies because it has internal regulator and D/A power supply circuits.

Functions

- Amplifier supports 1-bit DACs
- LPF amplifier
- ATT circuit
- Mute circuit
- DAC power supply (5.1V)
- Internal circuit regulator
- Internal power on/off mute circuit

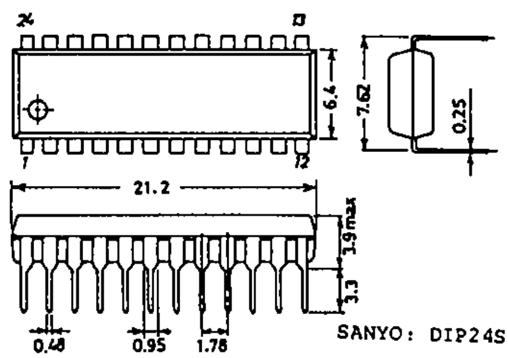
Features

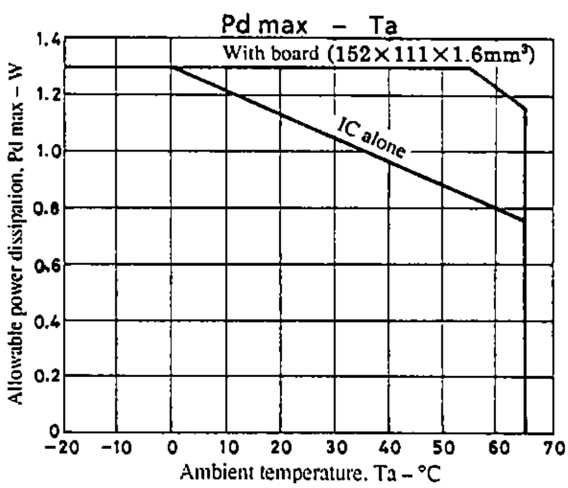
- Allows compact implementation of CD player output circuits
- Supports 1-bit DACs
- Low harmonic distortion 0.0006% typ (1kHz)
  0.0012% typ (10kHz)
- High S/N ratio 108dB typ (JIS–A)
- Can be used directly with non-stabilized power supplies
- Low pop noise at power on/off

Package Dimensions

unit : mm

3067 - DIP24S





Specifications

Maximum ratings at Ta=25°C

				unit
Maximum supply voltage	$+V_{SUP}$ max		14	V
	$-V_{SUP}$ max		–14	V
Allowable power dissipation	Pd max	Ta≦55°C, 152x111x1.6mm3	1.3	W
Operating temperature	Topr		–20 to +65	°C
Storage Temperature Range	Tstg		–40 to +150	°C

Recommended Operating Ranges at Ta=25°C

				unit
Recommended supply voltage	$+V_{SUP}$		9	V
	$-V_{SUP}$		–9	V
Power supply voltage operating range	$+V_{SUP}$ op	(not to exceed Pd)	7 to 13	V
	$-V_{SUP}$ op	(not to exceed Pd)	–7 to –13	V

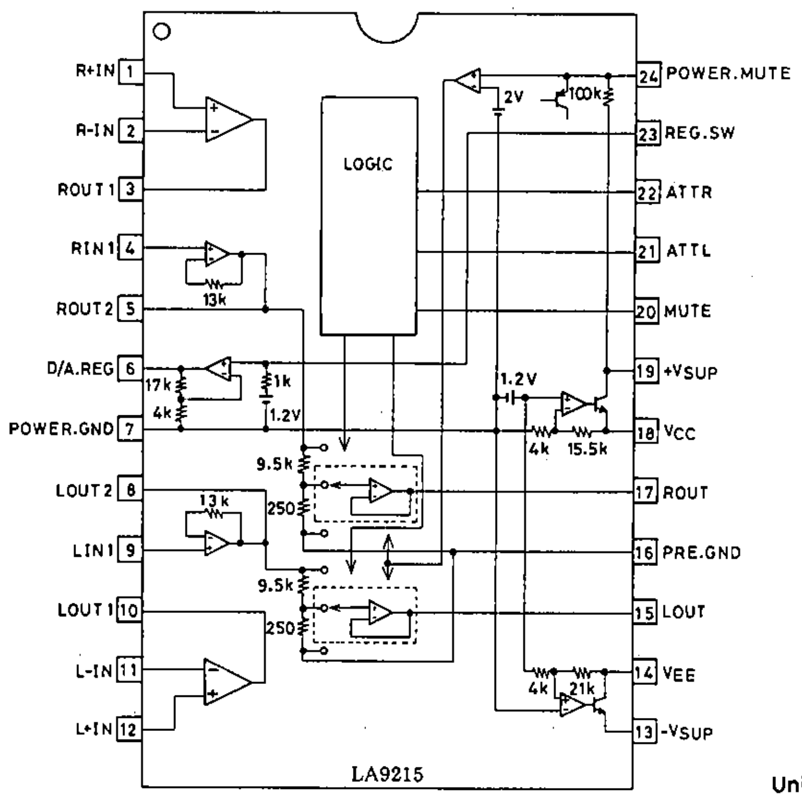
Operating characteristics at Ta=25°C, $\pm V_{SUP}=\pm 9V$, Vi=2Vrms=0dB, fin=1kHz, R_L=10kΩ

			min	typ	max	unit
Quiescent current	I_{SUP}	No current	27	37	42	mA
	$-I_{SUP}$	No current	–38	–33	–23	mA
ATT ratio	V_{ATT}	LPF=20kHz	30.5	32	33.5	dB
Muting ratio	M_r	LPF=20kHz	65	100		dB
S/N Signal – mode	S/N_S	JIS, A	86	108		dB
S/N ATT – mode	S/N_{ATT}	JIS, A	86	120		dB
S/N MUTE – mode	S/N_{MUTE}	JIS, A	86	120		dB
Channel separation	CH_{sep}	LPF=20kHz	80	105		dB
THD+N(1kHz)	THD_{1K}	LPF=20kHz		0.0006	0.003	%
THD+N(10kHz)	THD_{10K}	LPF=20kHz (fin=10kHz)		0.0012	0.004	%
Line output ripple rejection	Lin_{RR}	LPF=20kHz, fin=120Hz	73	80		dB
Amplifier output offset voltage	V_{OFS}		–15		15	mV
Amplifier output offset voltage difference	V_{OFSD}	Signal mode - ATT mode ATT mode - Mute mode Signal mode - Mute mode	–10		10	mV

[Voltage regulator for D/A]

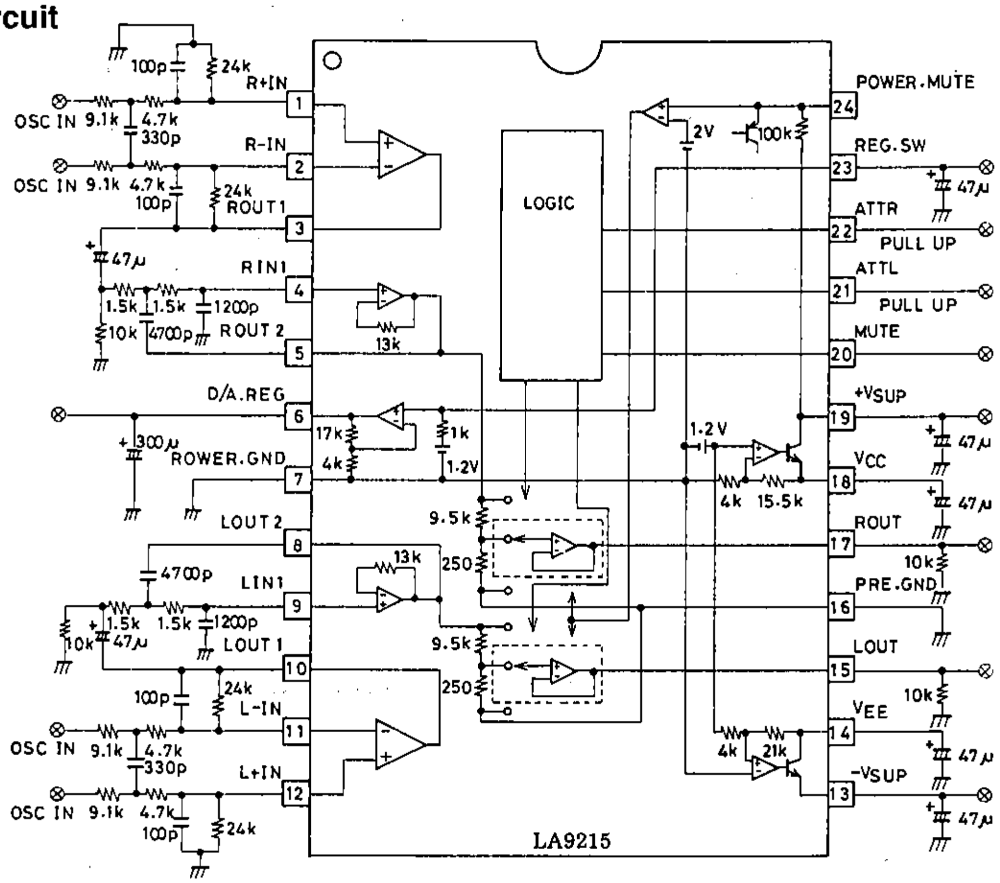
			min	typ	max	unit
Supply voltage	D/A_V	No-load	4.8	5.1	5.4	V
Maximum output current	D/A_I		25			mA
Ripple rejection	D/A_{RR}	25mA load (fin=120Hz), LPF=20kHz	60	73		dB
Load regulation	D/A_{LR}	25m load		2	100	mV

Equivalent circuit block diagram and pin assignments



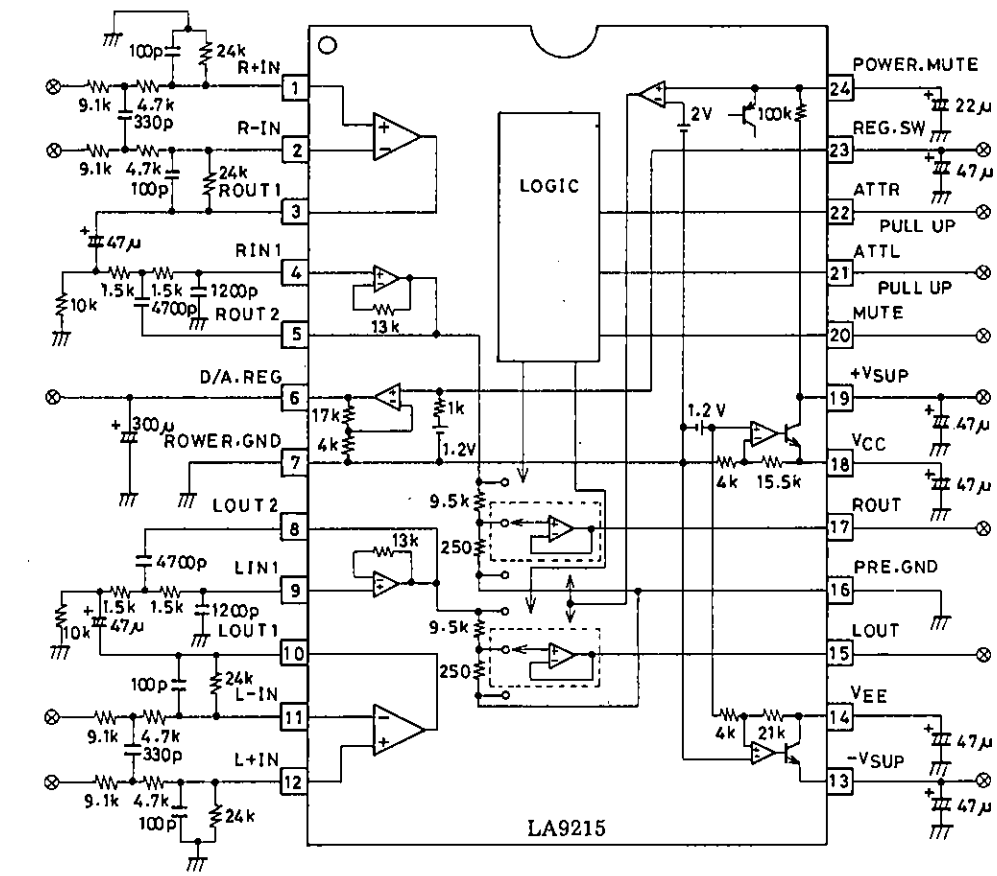
Unit (resistance: Ω)

Test circuit



Sample application circuit

Unit (resistance: Ω, capacitance: F)



Control mode

L ch ATT 21pin	R ch ATT 22pin	MUTE 20pin	Lch mode	Rch mode
H	H	H	SIGNAL	SIGNAL
L	H	H	ATT	SIGNAL
H	L	H	SIGNAL	ATT
L	L	H	ATT	ATT
H	H	L	MUTE	MUTE
L	H	L	MUTE	MUTE
H	L	L	MUTE	MUTE
L	L	L	MUTE	MUTE

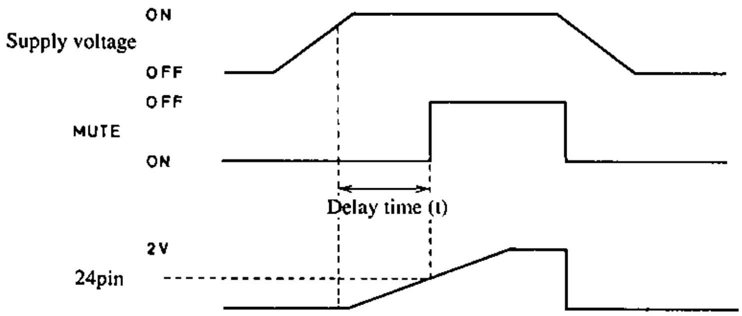
※Pins 21 and 22 are pulled up, and pin 20 down.

D/A REG.SW 23pin	D/A REG. 6pin
OPEN	5.1V
GND	0V

Function description

(1) Power on/off mute

When the supply voltage has not reached the operating voltage level, the system is in the muted state. Adding a capacitor to pin 24 will extend the period of time the mute is in effect after power is turned on.



- In the power on/off mute state, pins 15 and 17 are low active.
- When the power is turned on or off, and +Vsup and -Vsup rise and fall times are significantly different from each other, the power on/off mute function may not operate normally.

(2) 1-bit DAC amplifier

External resistance and capacitance can be added to configure a 1-bit DAC input amplifier.

- Capacitors will contribute to degraded harmonic distortion, so field dependence should be minimized.
- If the external components for the 1-bit DAC amplifier (differential input) have a large difference, the difference will become an offset, and DC will be cut in the LPF input stage.
- Use with a load short may damage the chip. Never use in a load short condition.

(3) Low-pass filter (LPF)

External resistance and capacitance can be added to configure an active filter.

- Capacitors will contribute to degraded harmonic distortion, so field dependence should be minimized.
- Use with a load short may damage the chip. Never use in a load short condition.
- The low-pass amplifier has internal resistance, so the output offset will vary with ambient temperature and consumed power.

(4) Output stage amplifier

Pins 20, 21 and 22 can be controlled to select signal, ATT or mute mode. Power on/off muting can also be used.

- Use with a load short may damage the chip. Never use in a load short condition.

(5) DAC power supply

Supplies 5.1V DAC power. Pin 23 can be switched between open and ground to turn the power output on or off.

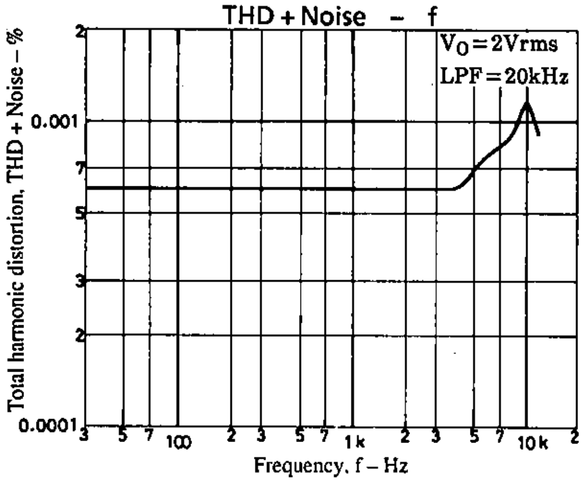
- Use with a load short may damage the chip. Never use in a load short condition.

(6) +/– 6V supply

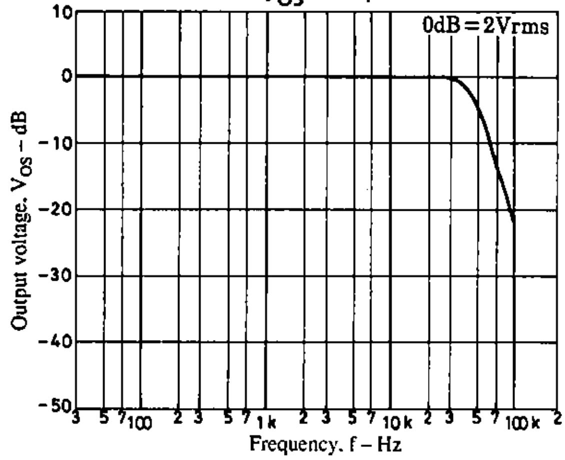
A supply is provided for the internal amplifier.

- Do not use this as an external power supply. Pins 14 and 18 should always have capacitors (about 47uF) inserted between them and ground.
- Use with a load short may damage the chip. Never use in a load short condition.

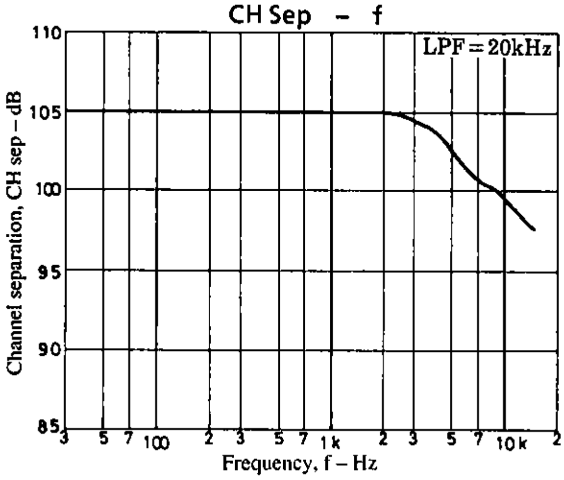
THD + Noise – f



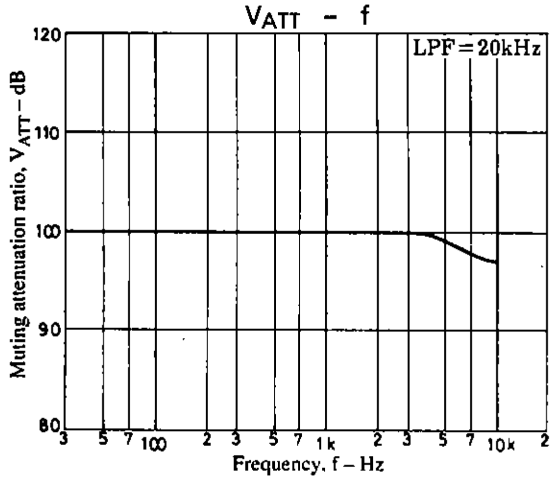
V_{OS} – f



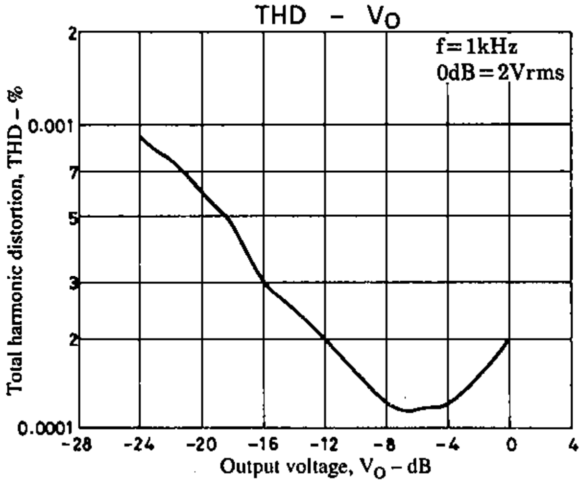
CH Sep – f



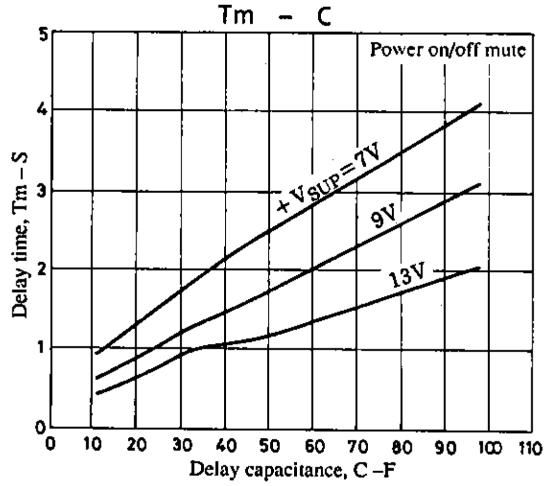
V_{ATT} – f



THD – V_O



Tm – C



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